REMARKS

Before reviewing the specific rejections which have been interposed by the Examiner, a brief review of the nature and substance of the present invention is believed to be in order. This application relates to refining elements which are known to include patterns of bars and intermediate grooves formed in different ways, depending upon the nature of the fibrous material being worked and the degree of working desired. In the case of lignocellulosic material, which is the type of material which is the principal object of this invention, the nature of the material itself changes as it moves from the inner end of refining elements to the outer surface thereof. The inner portion is intended to carry out initial disintegration of the lignocellulosic material and to advance the material outwardly in the refining gap between two counter-rotating refining discs. Defibering or separation of the fibers of this material can also take place in the inner portion of the refining gap, in which the greatest distances exist between those refining surfaces. It is further desired that working or refining of the fibrous material occur in the outer portion of the refining element. The present invention is most particularly concerned with the transition zone between the inner and outer portions of the refining elements, and particularly where the use of a finer pattern of bars in the outer portion, for greater refining, tends to slow down the material moving outwardly therefrom, thus increasing the load on the bars in this location. These bars thus tend to be subject to increased wear in this position.

The present invention has as its principal object the reduction of this problem and, in fact, the evening out of the wear of the bars over the entire surface of the refining disc. This improves the durability of these refining elements, reducing the wear of the disc and in particular the bars located

thereon. These results are realized in accordance with the present invention without compromising the grinding efficiency of the discs themselves, and all of this is achieved by the combination of features set forth in these claims. The required wider bars of the inner region of these refining elements are thus adapted to withstand the higher wear created by coarser grinding and greater variations in the size of particles in this region. The varying distance of the transition region from the inner end of these refining elements tends to spread the heavy wear involved in this region as discussed above over a much larger area. Finally, the thinner bars in the outer region of the refining discs of the present invention complete grinding to a desired level without jeopardizing the durability of this region. None of this is accomplished by use of the prior art devices cited hereagainst. We now tern to the specific rejections herein.

Claim 3 has been rejected as being anticipated by either Virving '003 or Gingras '071 under 35 U.S.C. § 102(b). The Examiner contends that both patents show refiner plates with transition portions of varying width from the inner edge of the plate. This rejection is respectfully traversed in view of the above arguments and for the reasons set forth hereinafter.

Applicant submits that neither of these reference anticipates or renders obvious claim 3. Turning first to Virving '003, it is noted that this patent is specifically directed to the use of a refining segment in which the raised bars in each of the zones extend outwardly at specified angles with respect to the predetermined radius of the refining segment. The refining segment thus shown in the figure of Virving '003 shows that the raised bars in each of the inner, intermediate and outer refining zones extend outwardly at angles which decrease as one moves in that direction. It is thus initially clear that the bars which extend from the inner end

continuously to the outer end of the refining segment in Virving '003 do not demonstrate any change in size or width. Indeed, there is no reference whatsoever to the width of these continuous refining bars, and since they are continuous in many respects, it is apparent that they have the same width from the inner to the outer ends thereof. Secondly, there are what could be called "transition regions" between the inner and intermediate regions and between the intermediate and outer regions thereof. Even limiting one's consideration to the transition zones between the intermediate and outer regions of same, however, reveals that there is clearly no difference in the width of the bars extending thereacross. It is thus clear that Virving '003 does not meet the limitations of claim 3, and cannot thus provide all of the above-noted advantages in terms of durability and consistent wear across the entire face of the refining disk.

Turning to the Gingras '071 Patent, this reference is specifically directed to a particular problem in connection with disc grinders for lignocellulosic material. In particular, the patentees are concerned with the generation of steam between the rotating plates, and more particularly with the backflow of this steam towards the inlet zone thereof. This backflow creates significant problems both in terms of the operation of the disc in general and in terms of the return of lignocellulosic material to the inlet thereof. The Gingras '071 Patent is also specifically concerned with a pair of rotating discs including a stator plate and a rotor plate which are both described therein.

The specific design of both of these plates shown in Gingras '071 does not meet or teach the limitations of claim 3 hereof. In particular, claim 3 requires a plurality of first bars and intermediate grooves disposed on the inner portion of the refining surface. This is true of neither the rotor plate or the stator plate in Gingras '071. In the rotor plate of Fig. 2,

there are only included the specifically designed curved braker bars 36, 36', which are intended to curve in a direction opposite to the direction of rotation of the rotor plate in order to maximize the feeding ability thereof and to block the back-flowing steam and fibrous material carried thereby. Secondly, and even more importantly, claim 3 requires that the transition region defined between the inner and outer portions of applicants' claimed refining element have a varying distance from the inner edge of the refining element across the refining surface. No such structure is shown in any of the embodiments of Gingras '071. Indeed, in each of these embodiments, three regions are described; the inner region, the outer refining region including a plurality of radially projecting bars and grooves, and the intermediate slippage area 62, 62'. This latter area can either be a smooth surface 66 (Fig. 4) or can include low-profile restrictions 68, such as ramps or dams, which are, in fact defined as not including bars and grooves, such as those "found in conventional stator plates." (*See* col.5 ll.64-65.) Thus, Gingras '071 includes neither a transition region defined by the first and second bars in the inner and outer portions of applicants' refining element, nor indeed any transition region which has a varying distance from the inner edge thereof. If the Examiner is referring in this respect to the various pyramid-shaped protrusions or restrictions shown in Gingras '071, these simply do not define the transition region required by present claim 3, and they are certainly not formed by the bars and grooves in the inner and outer region thereof.

Similar contentions can be made with respect to the stator plate as shown in Figs. 3 and 6 thereof. In this case, the inner portion 90 has a smooth surface 92 for maximum feeding or it might include a low-profile pattern of protrusions to help control the feed of the material. However, once again in this case, the radially outer portion 94 of the inlet zone includes

only dams 96 instead of bars and grooves, so that there is neither a transition region of any kind as required by claim 3, and certainly not one having varying distance from the inner edge of the refining element itself.

It is therefore clear that claim 3 clearly and patentably defines over these references, including Gingras '071. Reconsideration and allowance of this claim is therefore respectfully solicited.

Claims 3-5 have been rejected as being anticipated by Phillips under 35 U.S.C. § 102(b). Phillips is said to show a refiner plate having transition portions of varying width from the inner edge of the plate, noting that the bars are considered to be sides 17 with an associated recess in each bar. This rejection is respectfully traversed in view of the above arguments and for the reasons set forth hereinafter.

Turning to the Phillips patent itself, it is initially noted that this reference is directed to an attrition feed mill for grinding feed, and the invention thereof is directed to the novel grinding plates thereof.

The Examiner's position with respect to the presence of bars appears to refer to the radial ribs 12 projecting from the plate, with grooves 16 in the middle of the radial ribs forming sharp cutting edges 17. Each of these bars, even if they are considered to be equivalent to the bars required by claim 3, certainly do not suggest in any way the presence in Phillips of a plurality of first bars and intermediate grooves disposed on the inner portion of the refining surface having a greater width than the plurality of second bars and intermediate grooves disposed on the outer portion of the refining surface. Thus, no transition region defined by these inner and outer portions of the refining surface is created in Phillips. Secondly, reference is made to the eccentric rib 15 projecting from the face of each plate between the outer or peripheral ribs

and the inner edge 9 thereof. This is an important element in the Phillips invention, to the extent that these eccentric ribs are located on adjacent refining surfaces to force the grain against the eccentric rib on the opposite plate as the two plates rotate relative to each other.

Thus, in addition to the clear differences between the radially projecting bars and grooves required by claim 3, and the fact that no transition region is created thereby in Phillips, it is also clear that these differences are more than mere happenstance — they are the result of the fact that Phillips is not in any way directed to the specific objects of the present invention.

Contrary to the reasons for the eccentric rib 15 in Phillips, the presently claimed refining segments are intended to improve the durability and reduce the wear of the disc and particularly the bars thereon. Indeed, Phillips' object of improving the grinding efficiency thereof by introducing more cutting edges is achieved by compromising the durability of the disc and the bars, a result exactly opposite to the aims of the present invention. In Phillips, the relatively thin bars in the inner region thereof, which are exposed to heavy wear, in the context of the present invention would wear out extremely rapidly. Thus, the entire disc would have to be exchanged long before the bars in the outer region wear out. In accordance with the present invention, this problem is avoided and consistency of wear is the desirable achievement thereof.

In accordance with the present invention, the durability of the entire disc is achieved without compromising grinding efficiency. Thus, the inner, outer and transition regions of the presently claimed invention will wear out at substantially the same rate, again as contrasted to the case in Phillips. The wider bars required in the inner region of the present claims can thus withstand higher wear due to coarser

grinding and the relatively large variation in the particle sizes in this region. The varying distance of the transition region from the inner end of the refining elements of the present claims spreads the heavy wear involved in this region over a larger area. Finally, the thinner bars in the outer region of the present refining elements furnish the grinding to a desired level without jeopardizing durability in this region.

The same is obviously at least equally true with respect to claims 4 and 5 since Phillips does not disclose a transition region as required by these claims which is arc-shaped and which has a distance from the inner edge of the refining element which increases continuously from one side edge to the other side edge. This again is clearly the case since the required "transition region" as set forth in claim 3 is not disclosed in Phillips, which does not in fact disclose any transition region created by the required first and second bars and intermediate grooves in the inner and outer surfaces thereof.

It is therefore respectfully submitted that all of the claims in this application clearly possess the requisite novelty, utility and unobviousness to warrant their immediate allowance, and such action is therefore respectfully solicited. If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

Finally, if there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

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Respectfully submitted,

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